

End of the World---Comet Revives Fear---Impressive Sights Have Been Seen at Times---Danger of Colliding With a Nebula

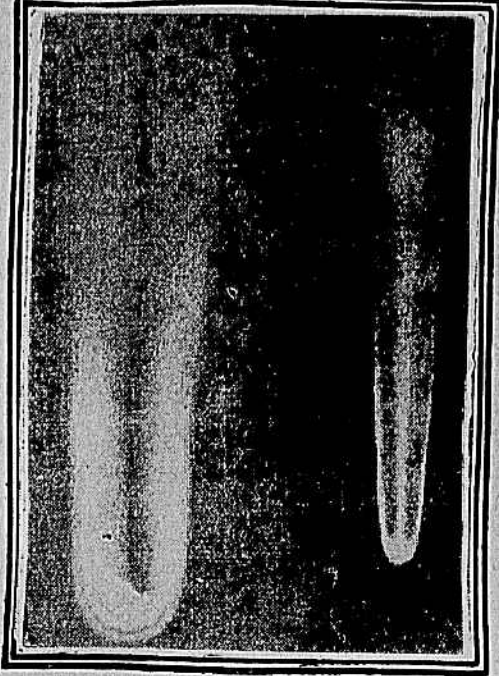


PROF. WILLIAM H. PICKERING.

BY JOHN ELFRETH WATKINS.
Terror to thousands of innocents will result from the ill-considered announcement that Halley's comet, through whose tail we will shortly pass—contains cyanogen gas and hydrogen, a combination possibly fatal to animal life. Already the prophets of the nature fakers' school are at work describing very graphically how the human race may be totally exterminated by asphyxiation on May 18.

Nothing has plagued mankind so persistently as this fear of the end of the world, and from earliest times cries of the final calamity have been divided between those believing that fire and those believing that deluge would exterminate mankind. More recently the prevailing notion of science has been that cold and drought would gradually eliminate our race.

The belief that fire will put an end to our earthly history has been most popular because of the biblical authority thereto, and of the various astronomical phenomena considered as likely to literally set the world on fire, for the final holocaust comets have always been looked upon as the likeliest. This dread used to be shared even



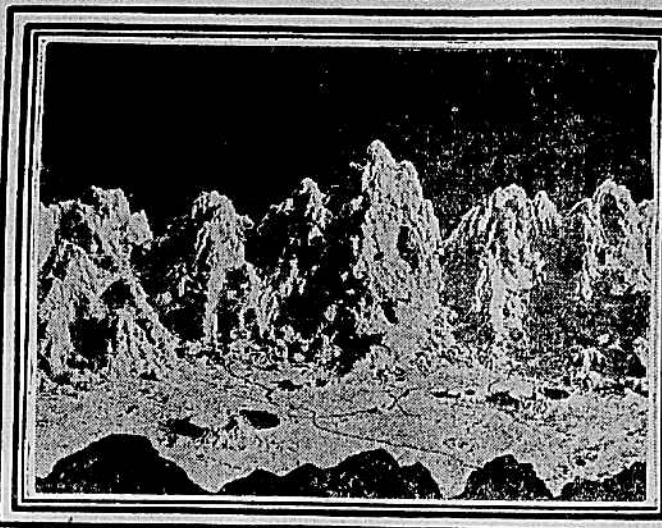
COMETS. TWO OF THE BEST PHOTOGRAPHED.

by men of science, who believed with the populace that the heads of comets were great stars, incandescent like our sun, and that their tails were vast blazes of fire, streaking the heavens. This belief, although still obtaining among the masses, has long ago been forsaken by astronomers, the more advanced of whom now believe the head of a comet to be a concentrated swarm of meteors enveloped in gas, and the tail to be a current of electrified gas proceeding from it. The spectroscopic shows that the gases composing comets are chiefly hydrogen and carbon, while sodium and iron have also been observed in smaller quantities. These gases become so rarified in the comet tail that the faintest stars appear through it, undimmed, as it sweeps the heavens for millions of miles.

Just what will happen when we pass through the tail of Halley's comet



GREAT NEBULA IN ANDROMEDA.



MOON LANDSCAPE, DRAWN TO SHOW FUTURE OF EARTH'S FERTILE REGIONS.

et May 18 remains a source of wonderment even to those whose minds are above the common dread of the experience. To these it may be said that the great tail which we are to pass through is more shadow than substance. This will be appreciated the better when it is further explained that our planet itself has, at times, a comet tail—the aurora, or "northern lights"—and that we have a number of times passed through the tails of comets, notably in 1819 and 1861, without those events having been known until after the encounters occurred. The only effects ever associated with them have been some beautiful sunsets.

But suppose we should come in contact with the head of a comet and not merely the outermost tip of the tail, as will be the case May 18? Here is what Professor W. H. Pickering, of Harvard Observatory, has to say as an answer to this question:

"Should we come in contact with the head of a small comet there would undoubtedly be a fine meteoric display. That is, in fact, probably what happened in 1833, and also on a number of previous occasions—notably in 472, 902, 1029, 1202 and 1799, although the comet itself was not luminous.

"If the comet were moving rapidly with regard to the earth, as in these cases, the meteor would be consumed at a great altitude in our atmosphere and no harm would be done. If the comet were moving in the same direction as ourselves, however, and at about the same speed, the matter would then become more serious, as many of the meteors might hit earth's surface."

So we passed through a comet's head according to Prof. Pickering, November 13, 1839, when we had our greatest meteoric display of all history, one which caused consternation among the ignorant, many of whom believed the end of the world to be surely at hand. North America was the part of the earth's surface bombarded at that time, and over it the fiery acetylene fell as thick as snowflakes. But these composed the head of only an invisible comet. The visible comet head which has ventured nearest us was Lexell's, which came within 1.5 million miles in 1770. Its head then looked to be four times the diameter of the moon.

If We Struck the Head.
"Should earth strike the nucleus (head) of a great comet like that, for instance, of 1835, it is impossible to tell what would happen," added Prof. Pickering, "but possibly the temperature and shock would be such that all life within several thousand miles of the point of contact would become extinct. Considering the vast recesses of celestial space, however, the impact would be like that of a pebble falling into the sea. The probability of such an encounter may well be likened, as someone has suggested, to the chance that if a man should shut his eyes and fire a gun into the air he would bring down a bird."

The most serious encounter of this kind of which there is material evidence left upon our sphere seems to have taken place centuries ago near Canyon Diablo, Western Arizona, where there lies a considerable crater, which used to be attributed to volcanic action, but which is now believed to have been the work of a gigantic meteorite. Dr. G. P. Merrill, head curator of geology in the National Museum, has lately confirmed this suspicion and has estimated that this projectile hurled from the skies may have weighed 600 tons. Meteorite material scattered for miles in the surrounding plains shows that this meteorite struck with such force as to convert the sand into glass and its own material into diamonds.

If It Struck the Sun.
Collision of a comet with the sun is a catastrophe which astronomers regard as much more likely than one's contact with the earth. The head of the great comet of 1843 ventured within but 32,000 miles of the sun, near enough to have been lapped by some of the solar protuberances. If it had fallen into the sun it would probably have caused only a slight rise in our temperature and a violent magnetic

disturbance. Perhaps these effects, which are often simultaneously noted by our meteorologists, are due to just such causes. Who knows?

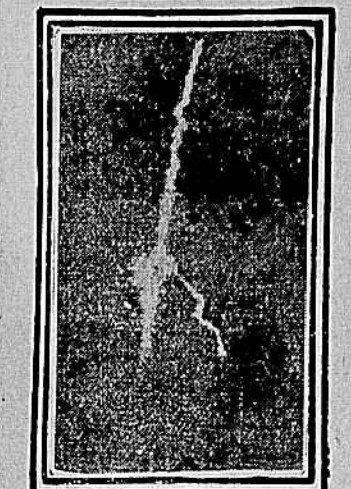
That 500-ton meteorite which hit us near Canyon Diablo was a monarch of its kind. The great majority of these missiles falling from the heavens are not over a grain in weight. Professor Simon Newcomb estimated that 150,000,000 meteorites enter our atmosphere every twenty-four hours. So terrible is their speed that the friction produced by their contact with our atmosphere generally burns them up completely before they can reach the ground. We begin to see the large ones when they catch fire at about seventy-five or a hundred miles up, but their substance has generally been consumed and their fire has usually become extinguished by the time they have dropped to within forty or fifty feet of the ground. Thus they go

off into a puff of dust and gas. It is when one of these heavenly bombs happens to be travelling through space in the same direction with the earth that it comes within our atmosphere so gently that it will not become consumed before reaching the ground. This seems to have occurred in the case of the great Arizona meteorite and the largest fragments elsewhere discovered—such as those, weighing several tons, brought from Greenland by Commander Peary and Baron Nordenskjöld.

Fate has been kind to us in these two greatest bombardments to which earth seems to have been subjected thus far from this source. In the one case a desert spot in the Southwest was selected for the target, which in the other case was a frozen waste within the Arctic regions. These great projectiles may have been parts of the heads of comets, or meteorites travelling individually or in shoals. Such swarms are constantly traversing space along just the kind of paths that comets pursue, each a great, long, elliptical ring, like the flattened, long-drawn-out ring of a chain. These endless ring paths stretch about the sun. If we could stand by one of these ring courses and could observe what was



EDWARD HALLEY (1656-1742), Discoverer of the Comet.



LARGE METEOR, PHOTOGRAPHED.

happening thereon we would now and then see the black thousands of contestants pass by in a broad cylindrical column often thicker through than earth. Sometimes the stragglers are so many that it takes two years for the end of the procession to get there, and it is some of these that we meet with every night as our globe flows into the path of one of these meteor swarms. Now and then we cross one of these racing rings just in time to collide with the new body of a comet. Such a collision has occurred every thirty-two to thirty-four years with what we term the "November meteors," while every August we cross another one of these rings, everywhere along which a race seems to be in progress at all times. Such swarms of meteors, seen from time to time, have "gone out" after having been pulled apart by the tide-producing action of the sun. Thus Biela's comet split in two in 1846, and when next due, in 1872, was encountered in the form of a new and brilliant shower of meteors, seen again in 1885 and 1892. Thus in those three years we went through the remains of a comet without damage.

Will We Collide With a Star?
New light on the earth's fate may be afforded by a research being conducted by the astronomers of Lick Observatory, under the bequest made by Dr. Osgood Mills a few years before his recent death. A negro preacher was long an object of interest because of the persistence with which he argued that "the sun do move." One of the first natural lessons taught the youth of the generation now grown up was that the sun, which did not rise or set as children supposed—was a fixture in the skies. But, as a matter of fact, "the sun do move," carrying all of its planets and their satellites along with it, and what concerns the astronomers now is to determine its direction, and the constellation of stars toward which it is moving.

Lyre was decided upon as the bull's eye of the celestial target which we are fated to hit. These observations were made with the spectrophotograph, which records the directions of the stars with respect to the sun. But the estimates have not been taken into consideration the bright stars visible in that quarter of the sky surrounding the South Pole. To observe these, and thus make this particular survey of the heavens complete, a wonderfully ingenious spectrophotograph donated by O. Mills was some time ago taken to the Lick Observatory at Chile, and mounted upon one of the hills overlooking the city of Santiago.

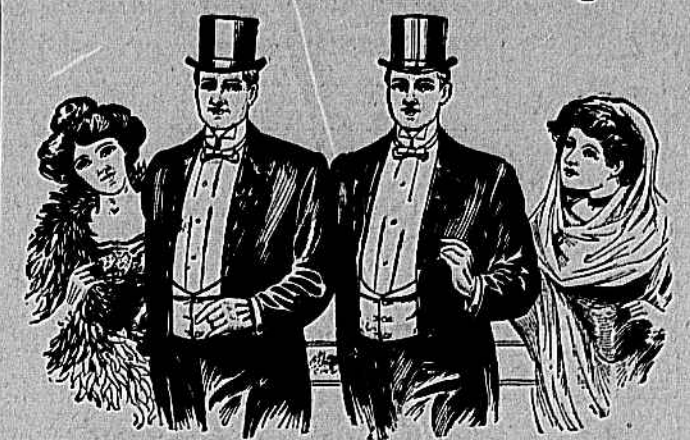
The speed at which we are rushing toward the southern boundary of the constellation of the Lyre has been estimated at between five and twenty miles per second, the most widely approved estimate now being twelve and one-half miles per second.

Our collision with some star, met with in this flight through infinite space, is a possible catastrophe now often discussed by gentlemen contemplating the world's extinction by fire. But such a collision need not concern us, inasmuch as it would take us millions of years to reach the nearest star of the heavens, even if we were aimed directly at it and were travelling at the highest speed seriously considered by astronomers. Vega, the bright particular star in the constellation of the Lyre, toward which we are supposed to be going, is so distant that it requires twenty-three years to travel to earth. Thus, if it had dropped out of the heavens in the year 1887 (we would not have missed it until now). Astronomers with whom I have discussed the subject generally agree that even if the solar system does eventually pass, like a volley through the great celestial harp, it will go through without breaking any of the golden strings or striking a discordant note in that harmonious song which the stars sing together.

But suppose a dark star in this

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We might meet a dark star in this